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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/598,285	06/21/2007	Gerold Gruendler	I431.174.101/FIN565PCT/US	2329

25281 7590 05/04/2009

DICKE, BILLIG & CZAJA
FIFTH STREET TOWERS
100 SOUTH FIFTH STREET, SUITE 2250
MINNEAPOLIS, MN 55402

EXAMINER	
THOMAS, BRADLEY H	

ART UNIT	PAPER NUMBER
2835	

MAIL DATE	DELIVERY MODE
05/04/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/598,285	GRUENDLER ET AL.	
	Examiner	Art Unit	
	BRADLEY H. THOMAS	2835	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 April 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *10,11,14-19,22-28 and 30-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *10,11,14-19,22-28 and 30-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/21/09 has been entered.

Claim Objections

2. Claims 17 and 22 are objected to because of the following informalities:

Regarding Claim 17, “two cooling plates” are claimed, however a cooling plate was already claimed in claim 10. It is unclear if the two cooling pates in claim 17 include the cooling plate in claim 10, or represent two additional cooling plates in addition to the cooling plate in claim 10. Applicant is suggested to review the cooling plates of claims 10 and 17. For purposes of examination, Claim 17 will be treated as two cooling plates, wherein one of the two cooling plates is the cooling plate from claim 10.

Regarding claim 22, lines 1-2, “a cooling grid structure” is claimed. However, a “cooling grid structure” was already claimed in claim 18. Applicant is suggested to state whether or not the cooling grid structure in claim 22 is different from or the same as the cooling grid structure in claim 18 in order to avoid issues of antecedent basis. For

purposes of examination, the examiner will consider the cooling grid structure in claim 22 to be the same as the cooling grid structure in claim 18.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 18, 22, 27, 31-33 and 38 are rejected under 35 U.S.C. 102(b) as being anticipated by Yasufuku et al. (US 6,278,610).

Regarding independent Claim 18, Yasufuku et al. teaches a power semiconductor device having a cooling system comprising:

- at least printed circuit board (110) arranged in one of a plug-in contact strips (e.g. 211, see Figs. 6A-B) of a superordinate circuit carrier (300) and having at least one power semiconductor component (120) positioned thereon and a plurality of other semiconductor components (120) arranged adjacent thereto;
- a cooling plate (230) mounted in a pivotable manner, via a tilting mechanism (220) extending from an edge of the cooling plate (230), about a tiling axis (221) on the plug-in contact strip (e.g. 211, see Fig. 6A) in a region of the at least one of power semiconductor component (120) and configured to be pivoted about the

tilting axis (221) via the tilting mechanism (220), wherein the tilting axis (221) extends parallel to the plug-in contact strip (e.g. 211); and

- a cooling grid structure (see peaks and valleys on top of 230 in Fig. 4) fitted on and extending from edges of the cooling plate (230), the cooling plate (230) having a first mounting and maintenance position (Fig. 4) pivoted away from the power semiconductor component (120), and a second cooling and operating position (Fig. 7) wherein the cooling plate (230) is pressed onto the power semiconductor component (120) and the cooling grid (peaks and valleys on top of 230) covers at least a portion of the plurality of other semiconductor components (120) (see Fig. 7).

Regarding independent Claim 27, Yasufuku et al. teaches a cooling system for devices comprising at least one power semiconductor component (120), the power semiconductor component (120) being arranged along with a plurality of other semiconductor components (120), on a printed circuit board (110) arranged in a plug-in contact strip (e.g. 211) of a superordinate circuit carrier (300), the cooling system comprising:

- a cooling plate (230), mounted in a pivotable manner, via a tiling mechanism (220) extending from an edge of the cooling plate (230), about a tilting axis (221) extending along the plug-in contact strip (211) in a region of the at least one power semiconductor component (120), the cooling plate (230) having a cooling

grid structure (see peaks and valleys on top of 230, Fig. 4) fitted on and extending from edges thereof (see Fig. 7);

- means (see Figs. 4-7) for pivoting the cooling plate (230) about the tilting axis, which is parallel to the plug-in contact strip (211) between a first mounting and maintenance position (Fig. 4) wherein the cooling plate (230) is away from the power semiconductor component (120), and a second cooling and operating position (see Fig. 7) wherein the cooling plate (230) is pressed onto the power semiconductor component (120).

Regarding Claim 22, as best understood, Yasufuku et al. teaches:

- a cooling grid structure (see peaks and valleys on top of 230) is configured at an upper edge side of the cooling plate (230) and projects beyond an upper edge of the printed circuit board (110) and into a cooling air stream (e.g. ambient air).

Regarding Claim 31, Yasufuku et al. teaches:

- the other semiconductor components (120) comprise semiconductor memory components (see col. 5, lines 39-47).

Regarding Claim 32, Yasufuku et al. teaches:

- the cooling grid structure (see peaks and valleys on top of 230) comprises metallic strips (e.g. the peaks) arranged at right angles to one another (via the valleys) (see Fig. 4).

Regarding Claim 33, Yasufuku et al. teaches:

- the cooling grid structure (peaks and valleys on top of 230) comprises metallic strips (e.g. the peaks) arranged at right angles to one another (via the valleys) (see Fig. 4).

Regarding Claim 38, Yasufuku et al. teaches:

- the means for pivoting comprises a snap-action tilting mechanism (224) extending from an edge of the cooling plate (230) which snaps onto and is rotatable about the tilting axis (220) (see col. 7, lines 4-29).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 10, 14, 30 and 34-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasufuku et al. (US 6,278,610) and further in view of Wang et al. (US 2006/0067054).

Regarding independent Claim 10, Yasufuku et al. teaches a cooling system for devices comprising a power semiconductor component (120), the power semiconductor component (120) being arranged on a printed circuit board (110) along with non-power

type semiconductor components (120), the printed circuit board (110) arranged in plug-in contact strips (e.g. 211, see Figs. 6A-B) of a superordinate circuit carrier (300), the cooling system comprising:

- a cooling plate (230), which is mounted in a pivotable manner via a tilting mechanism (220) extending from an edge of the cooling pate (230) about a tilting axis (221) on a plug-in contact strip (e.g. 211, see Figs. 6A-B) in a region of the power semiconductor component (120), and which can be pivoted about the tilting axis (221) which extends parallel to the plug-in contact strip (e.g. 211, see Figs. 6A-B), and a cooling grid structure (see peaks and valleys in top of 230, Fig. 4) fitted on edges of the cooling plate (230) and projecting in directions parallel to the plug-in contact strip (see Figs. 6A-B);
- the cooling plate (230) having a first mounting and maintenance position (see Fig. 4) pivoted away from the power semiconductor component (120), and a second cooling and operating position (see Fig. 7) wherein the cooling plate (230) is pressed onto and covers the power semiconductor component (120) and the cooling grid structure (see top of 230) covers the remaining non-power semiconductor components (120) arranged on the printed circuit board (110) adjacent to the power semiconductor component (120).

Yasufuku et al. discloses the claimed invention except for *explicitly* teaching separate power and non-power semiconductor components, the cooling plate only covering the power component, and the cooling grid covering the non-power semiconductor components. However, Wang et al. teaches that it is known to have a memory module

that has a power semiconductor component (120-D2) as well as non-power semiconductor components (120-D1), wherein 120-D2 is covered only by 170 and the other components 120-D1 are covered by 150 (see Fig. 11 and [0054]). It would have been obvious to one having ordinary skill in the cooling art to have arranged the cooling plate of Yasufuku et al. in a manner as taught by Wang et al., since Wang et al. teaches at [0054] that such a modification would have allowed for individualized cooling for components that generate a high amount of heat during operation versus components that generate a low amount of heat during operation. Thus, it would have been obvious to tailor the cooling plate of Yasufuku et al. in such a specialized configuration to allow for discrete cooling of different components on the memory module, since it would have allowed for cooling based on the amount of heat the respective component(s) generate(s). This would have improved the overall cooling of the memory module.

Regarding Claim 14, Yasufuku et al. alone teaches:

- the cooling grid structure (see peaks and valleys on top of 230) is arranged at an upper edge side of the cooling plate (230) and projects beyond an upper edge of the printed circuit board (300) and into a cooling air stream (e.g. ambient air) (see Fig. 7).

Regarding Claim 30, Yasufuku et al. alone teaches:

- the cooling grid structure (see peaks and valleys in top of 230) comprises metallic strips (e.g. peaks) at right angles to one another (via the valleys, see Fig. 4).

Regarding claim 34, Yasufuku et al. alone teaches:

- the tilting mechanism (220) extends from the edge of the cooling plate (230) and at an angle to a surface of the cooling plate (230) which is pressed onto the power semiconductor component (120) when the cooling plate (230) is in the operating position (see Figs. 4-7).

Regarding claim 35, Yasufuku et al. alone teaches:

- the angle comprises a 90-degree angle (see Figs. 4-7).

Regarding claim 36, Yasufuku et al. alone teaches:

- the tilting mechanism (220) comprises a snap action closure (224) which snaps about the tilting axis (221) (see col. 7, lines 4-29).

Regarding claim 37, Yasufuku et al. alone teaches:

- the tilting mechanism (220) comprises a snap- action hook (224) which snaps about the tilting axis (221) (see col. 7, lines 4-29).

7. Claims 11, 15-17, 19, 23-25, 26, 28 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasufuku et al. (US 6,278,610) taken with Wang et al. (US 2006/2267054) as applied to claim 10 above, and Yasufuku et al. alone as applied to claims 18 and 27 above, and further in view of Hsueh (US 6,775,139).

Regarding Claims 11,19 and 28, Yasufuku et al. alone (or taken with Wang et al.) discloses the claimed invention except for:

- the cooling plate has cooling fins on the cooling plate side not in contact with the power semiconductor component.

However, Hsueh teaches that it is known to have cooling fins (114) on an opposite side of a cooling plate (11) not in contact with semiconductor components (31) (see Fig. 2). It would have been obvious to one having ordinary skill in the cooling art at the time the invention was made to have used cooling fins on a cooling plate, since Hsueh states at col. 2, lines 20-28 that such a modification would have allowed for heat dissipation. Fins would have allowed for increased surface area to dissipate heat, and projecting the fins into the surrounding air would have allowed for greater heat dissipation into the surrounding environment.

Regarding Claims 15 and 23, Yasufuku et al. alone (or taken with Wang et al.) discloses the claimed invention except for:

- a cooling air stream device that generates a cooling air stream is arranged in such a way that it has a forced cooling parallel to the plug-in contact strip of the device to be cooled.

Hsueh teaches that it is known to use a fan (22) to generate a cooling air stream parallel to a strip (7) (see Fig. 1). It would have been obvious to one having ordinary skill in the cooling art at the time the invention was made to have used a fan to generate a cooling stream as taught by Hsueh, since Hsueh states at col. 2, lines 39-57 that such a modification would have transmitted heater air to a space above the components, thereby improving the heat dissipation and ensuring performance of the memory module.

Regarding Claims 16 and 24, Yasufuku et al. alone (or taken with Wang et al.) discloses the claimed invention except for:

- a cooling air stream device which is perpendicular to the plug-in contact strip of the device to be cooled, and into which the cooling grid structure projects.

Hsueh teaches that it is known to use a fan (22) to generate a cooling air stream perpendicular to a strip (7) and in an area where a cooling plate (e.g. 11, 114) projects (see Fig. 1). It would have been obvious to one having ordinary skill in the cooling art at the time the invention was made to have used a fan to generate a cooling stream as taught by Hsueh, since Hsueh states at col. 2, lines 39-57 that such a modification would have transmitted heater air to a space above the components, thereby improving the heat dissipation and ensuring performance of the memory module.

Regarding Claims 17 (as best understood) and 25, Yasufuku et al. (or taken with Wang et al.) disclose the claimed invention except for:

- the cooling system has two cooling plates which are opposite one another and which are arranged in a pivotable manner on a plug-in contact strip in the region of a power semiconductor component.
- a second cooling plate is mounted in a pivotable manner on the plug-in contact strip in the region of a power semiconductor component opposite to the cooling plate and on an other side of the printed circuit board.

Hsueh teaches that it is known to use two cooling plates (11) opposite one another to cool a memory module in a strip (7) (see Fig. 2). It would have been obvious to one having ordinary skill in the cooling art to have used two cooling plates as taught by Hsueh, since Hsueh states at col. 2, lines 8-27 that such a medication would have cooled both sides of the memory module. This would have allowed for improved cooling of the semiconductor components on the memory module.

Regarding independent Claim 26, Yasufuku et al. teaches a method for cooling a device having a power semiconductor component (120), the method comprising:

- mounting a pivotable cooling plates (230) via tilting mechanism (220) extending from edges of the cooling plates (230) about tilting axes (221) extending along plug-in contact strips (e.g. 211, see Figs. 6A-B) of a superordinate circuit carrier (300), the cooling plate (230) being in a mounting and maintenance position (see

Fig. 4) and having a cooling grid structure (see peaks and valleys on top of 230, Fig. 4) fitted on and extending from edges thereof;

- fitting a printed circuit boards (110) into the plug-in contact strips (211), the printed circuit board (110) having at least one power semiconductor component (120) positioned thereon and a plurality of other semiconductor components (120) arranged adjacent thereto, wherein the cooling plates (230) are positioned along the plug-in contact strip (211) region of the power semiconductor components (120);
- pivoting the cooling plates (230) about the tilting axes from the mounting and maintenance position (Fig. 4) into a cooling or operating position (Fig. 7), wherein the cooling plates (230) are held in contact with a corresponding power semiconductor component (120) of a corresponding printed circuit board (110) and the cooling grid structure (on top of 230) covers the plurality of other semiconductor components (120) adjacent thereto;

except for:

- orienting a device generating a cooling air stream, such that the cooling air stream flows parallel or perpendicular to the plug-in contact strip; and
- providing the cooling air stream during operation of the power semiconductor component in the event of a critical temperature of the power semiconductor components being reached.

Yasufuku et al. fails to disclose a plurality of power components, cooling plates, printed circuit boards and a plurality of plug-in contact strips. It would have been obvious to one

having ordinary skill in the art at the time the invention was made to duplicate the printed circuit card and the plug-in contact strip for additional modular capacity the device, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8. It is well known for computers to have multiple memory type modules and their associated slots (or strips) on a shared PCB.

Hsueh teaches that it is known to use a fan (22) to generate a cooling air stream parallel/perpendicular to a strip (7) (see Fig. 1). It would have been obvious to one having ordinary skill in the cooling art at the time the invention was made to have used a fan to generate a cooling stream as taught by Hsueh, since Hsueh states at col. 2, lines 39-57 that such a modification would have transmitted heater air to a space above the components, thereby improving the heat dissipation and ensuring performance of the memory module. The fan would have been operating during a normal operating condition or critical operating condition of the semiconductor components, thereby providing all around cooling.

Regarding claim 39, Yasufuku et al. alone teaches:

- the tilting mechanism (220) extends from the edge of the cooling plate (230) and at an angle to a surface of the cooling plate (230) which is pressed onto the power semiconductor component (120) when the cooling plate (230) is in the operating position (see Figs. 4-7).

Response to Arguments

8. Applicant's arguments with respect to claims 10-11, 14-19, 22-28 and 30-33 have been considered but are moot in view of the new ground(s) of rejection.

Applicant is suggested to further claim the structural relationship of the tilting mechanism with the cooling plate, grid structure and strip as well as the physical relationship of the cooling plate with the cooling grid in regards to cooling of the individual power/non-power components. For example, instead of stating "...the cooling plate is pressed onto and covers only the power semiconductor component...", Applicant is suggested to claim, for example, "...the cooling plate is pressed ***directly*** onto and covers only the power semiconductor component...". The terms “onto” and “covers” are broad terms that can be interpreted as being directly or indirectly contacting an element.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references teach plate type cooling structures: Lai et al. (US 20070263361), Lai et al. (US 20070195489) and Lee et al. (US 6,297,966).

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRADLEY H. THOMAS whose telephone number is (571)272-9089. The examiner can normally be reached on 7:00am - 3:30pm (Eastern).

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Jayprakash N. Gandhi can be reached on 571-272-3740. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BHT

/Jayprakash N Gandhi/

Supervisory Patent Examiner, Art Unit 2835